facts, but reviewing old facts in a way that will certainly be of value to those of us who have to feed children whose stomachs seem unable to digest normal percentages and usual mixtures of fat. The most interesting discussion in this section followed the papers of Cautley and Stiles, who discussed the condition of congenital pyloric stenosis. Specimens were exhibited which could leave no doubt in the mind of any one that the condition is truly congenital, and not, as some claim, post natal and due to attempts of a dilated stomach to empty itself. Ashby showed us a specimen from a child thirty-five days old, in which the pylorus was hypertrophied to at least half an inch in radius. The stomach itself was dilated and would hold probably about eight ounces. Other specimens were shown illustrating the same point.

Cautley dwelt upon the medical treatment and on diagnosis. His conclusion was that if one waited for the production of a dilated stomach which should show peristaltic waves and a tumour sufficiently large to be easily palpated, the general condition of the child would be such that operation would give it no aid. Stress was laid upon the scantiness of the stools, although this was by no means a necessary clinical point, for the case which Ashby showed allowed enough food to enter the intestine to provide a fairly bulky stool, but still that point, together with continuous vomiting must be one that leads up to operative interference. Such conditions are exceedingly rare. In twelve years he had seen fourteen cases, and he undoubtedly has an opportunity few men have to see cases of such a type. The great difficulties in diagnosis may be well imagined. For diagnosis Cautley divided the cases into three classes: (1) True productive congential hypertrophy; (2) Slight congential hypertrophy with post natal spasm and dilatation; (3) Pseudo hypertrophy due to spasm. Hutchinson created somewhat of a sensation by stating that in the last two years he had seen ten such cases, of which none had died, and he had initiated surgical interference in none of them, which results were quite opposed to general experience. Cautley went so far as to state that if Hutchinson had seen ten cases in two years, and they had recovered without operation, none of them were true congenital stenosis of the pylorus, that they were merely cases of spasm secondary to acute indigestion, Cautley's third class. In the discussion one fact was not brought out that seems to me of great importance, that is, the readiness with which certain fats, high in caprillic and caproic acids, can produce and do produce, spasm and a condition of pseudo stenosis, with dilation and vomiting, which is very difficult to diagnose, but which responds readily to the use of alkalies, lavage and minute doses of opium.

Stile's paper treated entirely of the surgical aspect, and his results were certainly not such as would encourage us to proceed to operation unless our case was one in which there was absolutely no question of true congenital hypertrophy, and in which the diagnosis was made fairly early. Forty-eight per cent of his operative patients died, and he probably has the average experience. He divided the procedure into divulsion and gastroenterostomy and pyloroplasty. He advised the latter operation, the v-y operation, as he called it, appealed more to surgeons than it does to me. He advised against the use of the gastroenterostomy ,and divulsion had produced no good results in his hands. He strongly opposed the dilating of the pylorus as being thoroughly unscientific and dangerous, stating that unless the pylorus was ruptured no good could come from it and it was much better to cut than to rupture, avoiding all danger of infection in the peritoneum.

The section of therapeutics, under the Presidency of Donald MacAlister, Cambridge, was in joint session with the section of medicine for one day. Most of the programme was given up to the value of alcohol in treatment, the opinions being diametrically opposed, but the final conclusion seemed to be that while alcohol was of use, especially in those case in which the prinicpal vessels were contracted, it was of little value in any other way, but great stress was laid upon the difference between alcohol pure, dilute, and alcohol in combination with the higher ethers, as in the better class of wines, most of the speakers laying stress on the fact that wines, such as sherry, and champagne, were of great value, when diluted alcohol was practically useless.

The meeting closed on Friday, and on Saturday the members were dispersed throughout the country, for a series of excursions and fetes.

SPASMODIC TORTICOLLIS.*

By P. C. H. PAHL, B. S., M. D., Los Angeles.

Synonyms—Caput obstipum spasmodicum; torticollis fonctionnel; tic rotatoire; torticollis mental; spasmodic wry-neck; torticollis spasmodicus; tic giratoire.

Introduction. About three years ago, I was called in consultation upon a case of spasmodic torticollis. It was the first case that ever came under my observation, and my having examined, up to that time, not less than two thousand orthopedic cases of all kinds, goes to show that the condition is a comparatively rare one.

I began looking up the subject in the literature at my disposal, and I was very much disappointed at the meagre information to be obtained.

I went ahead with my case, however, and did the best I could, determining that I would look up this matter exhaustively and bring all the facts obtainable together into one paper, which I would present to the Western profession, hoping that it might serve as a help in recognizing the condition and in choosing the method of treatment most applicable.

This article contains the report of cases and other information of value to be found in the papers of fifteen American, ten English, nine French, five German and two Italian authors. The different methods of treatment and the results of these are given in full, as well as three of my own cases and

*To have been read at the Thirty-sixth annual meeting of the State Society, San Francisco, April, 1906.

the operation which I have successfully performed.

These reports were abstracted for me from the *Index Medicus,* by Dr. Albert Allemann, of the United States Army Medical Museum, Washington, D. C.

Definition. Spasmodic torticollis is a spasmodic movement of the various muscles of the neck, chiefly the rotators. The principal element is a clonic spasm; all else is excluded. The spasm is aggravated when any voluntary muscular effort is attempted, but disappears during sleep, while lying down with the head resting firmly on a pillow, while sitting with the head firmly supported against the back of a chair, and, usually, while standing with the head supported against some firm object, such as a wall or post. Walking, to any extent, is impossible without supporting some point about the face or head, with the hand or some object held by it.

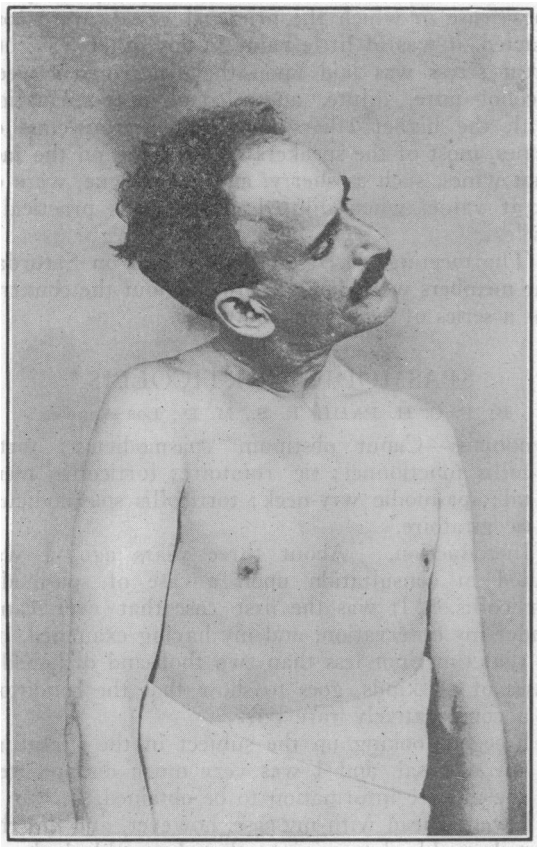

Figure 1.

Clinical Picture. The head is drawn sideways, obliquely, downward at once or in single jerks and rotated to such a degree that the ear approaches the shoulder and the chin is directed upward in the opposite direction; the sterno-cleido mastoid muscle, of the side toward which the head is drawn, is bulging out and often hypertrophied. In those cases, where the head is drawn backward and the shoulder upward, the trapezius can be felt in a state of rigid contraction—there may be pain in the body or the origin or insertion of the muscles affected.*1. Walking being impossible without support at some point about the face or head, it is interesting to note the different means which have been resorted to in order to disguise, to the public, this affliction; the placing of a lead pencil, an umbrella handle or cane against the point of the chin are methods frequently employed. One patient completely deceived me as to the real nature of his malady by wearing a pair of dark glasses—this naturally led me to think that he had some eye affliction. In walking, or while making any voluntary muscular effort, he would grasp one of the lenses with the apparent intention of adjusting the glasses, and this would give him sufficient support to get along after a fashion.

History. The ancient physicians, Hypocrates and Galen, do not mention this malady. Charles Bell, in 1830, mentions several cases; in 1837, Arnheim describes a case clearly and says that he had never read about such a disease. In 1838, Strohmeyer treated this condition surgically by dividing the sterno-cleido mastoid muscle. *1.

Bujalski first divided the spinal accessory nerve in 1835; myotomy was performed by Guerin in 1840. Both of these men were forgotten, and, in 1862, Campbel de Morgan, knowing nothing of Bujalski, proposed the division of the spinal accessory nerve and this operation is usually attributed to him. Since that time, the division and re-section of the spinal accessory nerve has been done by a large number of surgeons in England and America.* [27] The French also frequently operate for it, but quite a number attempt to treat this condition by suggestion and re-education, which they term the pedagogic treatment.

Etiology. Spasmodic wry-neck depends upon abnormal nerve action; the causes are, as a rule, obscure. A neurotic family history, grief, anger, mental overwork, astigmatism, muscular insufficiency, trauma, infectious disease, and degeneracy are frequently mentioned in the case reports. C. K. Mills says that the condition is very frequently due to differently situated irritating lesions.

1. A lesion in the spinal cord, anywhere above the fifth or sixth cervical segment.
2. An intra-spinal but extra-medullary lesion of membranes, bones or nerves in the upper portion of the vertebral canal.
3. A lesion of the medulla oblongata or floor of the fourth ventrical.
4. A lesion of the main trunk of the spinal accessory nerve as it passes downward in the sterno-cleido mastoid and trapezius muscles.
5. A lesion of any of the nerves which anastomose with the spinal accessory and are closely connected with it in the spinal cord.
6. A lesion of the cortical centers which preside over lateral deviation of the head.* [7]

Pathology. The pathology of spasmodic torticollis is still under controversy. It is at once obvious that the chief consideration is the spasm, but the movements of the head are complicated, and when the head is jerked into the true torticollis position, it involves a large number of muscles whose enervation is varied and complex. We are compelled to give some consideration to the view of Brissaud; it cannot be denied that a strong psychic element exists.

Many authors believe that it is a disorder of the cortical centers for rotation of the head; others that long continued habit, brought about by occupation or eye strain, may finally merge into spasm.

Statistics. In sixty-eight cases that I collected from the literature, I found that men and women were equally affected; it occurred most frequently between the ages of 20 and 30, and that the right side was affected twice as often as the left. Out of sixty-eight cases, twenty-five were females, twenty-four were males; and, in nineteen cases, the sex was not given. Between the ages of 10 and 20, there were three cases; between 20 and 30, nineteen cases; between 30 and 40, eight cases; between 40 and 50, thirteen cases; and between 50 and 60, five cases. By various treatments employed, twenty-eight recovered, seventeen were improved and eleven unimproved. In twelve cases, the treatment was not given.

The methods of treatment employed and their results were classified under the following headings:

Treatment. I divided the different treatments described in the sixty-eight cases into nine groups.

	Number of Cases	Improved	Unimproved	Recovered
Group 1. Hydrotherapy, Massage, Gymnastics, Electricity	1		1	
Group 2. Pedagogical	9	6	1	2
Group 3. Drugs and Medicines Administered internally and externally and counter irritants	6	1	4	1
Group 4. Mechanical	3		1	2
Group 5. Ligation of Spinal Accessory Nerve with silver wire	2		1	1
Group 6. Division of Cervical Muscles	14	4	3	7
Group 7. Stretching of Spinal Accessory Nerve	1			1
Group 8. Division of Spinal Acces- Nerve	13	5		8
Group 9. Division of Spinal Accessory Nerve and Posterior branches of the Upper three Cervical Roots	7	1		6

Group 1.—Hydrotherapy, Massage, Gymnastics and Electricity. There was one case treated by this method only; result, unimproved. With the exception of recent cases, I am convinced that these methods are of little value; there is nothing peculiar about their administration in these cases and, therefore, further details are deemed unnecessary.

Group 2.—Pedagogical. Under this group, there are nine cases; results, six improved, one unimproved, two recovered.

According to Brissaud, what we call psychotherapy is nothing else than certain words destined to show the patient where his will sins, and to exercise that which he still possesses, in a favorable sense. In these special cases, the trouble is confined to a fault of the inhibiting will capable of refraining a cortical caprice.

These words have nothing metaphorical and the method has nothing mysterious; it requires no especial power outside of mild firmness and encouragement, the first virtues of an educator. The physician, indeed, becomes an educator without borrowing anything from the more or less occult hypnotic suggestion. The patient must be immediately told that this co-operation is indispensable; he must voluntarily cause to act at the right moment the antagonistic muscles against those under spasm. It is, therefore, his own will that acts, not the personal will of the educator. I do not say that success will always follow; generally speaking, these spasms are the more difficult to cure the longer they have lasted and the older the patient.* [37]

E. Feindel, an associate of Dr. Brissaud, describes the treatment of a case in 1897, in the following manner:

The first step consisted in showing the patient that not only her hand had the power to arrest the movement, but that any other support would do the same. The patient is seated before an apparatus, which is called a campimeter; this consists of an instrument mounted upon a stand with a chin piece and a circular face divided into various degrees. A hand, which can be operated at will by the operator, is followed by the eyes of the patient; the patient is advised to take similar exercises at home in the afternoon. The seances take place every day at the same hour in the forenoon, last a few minutes and are discontinued as soon as there are signs of fatigue.

The treatment consists of very simple exercises; that is, exercises of immobility and exercises of movement. The exercises of immobility of the head are graduated thus: In the beginning, the patient is sitting with the head supported on an object other than the hand; later, the patient, still sitting, is leaning against a support only; later, he stands up and still later, he walks. In these various positions he strives to hold the head straight as long as possible, but, at the slightest sign of fatigue, the effort of his will must cease; it is well for the patient to fix his eyes upon some object, and here the campimeter is used. The exercises of movement are also little complicated at the beginning; the head is turned to the right and to the left; it is inclined on one shoulder, then on the other, and this in various attitudes of the body, the shoulders being drawn up, the arms raised or crossed. We modify the treatment in many ways or augment the difficulties with the improvements, but the simple movements of the beginning are repeated at each seance and each badly executed movement is repeated in the succeeding seance until it is perfect. The movements must be made slowly, softly and without jerks, and stop at the least sign of fatigue; the duration of the seance is variable. At the beginning, from two to four or six minutes, according as the patient gets fatigued more or less rapidly. In the same seance, the exercises of immobility are mixed with exercises of movement; there are from four to six seances every day and always at the same hours. At least one of these must be directed by the physician personally. A seance of gym-

nastics may be followed by from two to five minutes of electrization with a feeble current and from two to five minutes of massage.

The patient must not be left to himself until a marked improvement has taken place; by that time, he will understand that this simple method of treatment is the only true one. The patient should continue the exercises for several months after cured.

Group 3.—Drugs administered internally and externally, and counter irritants. Under this group we place six cases, with the following results: One improved, four unimproved and one recovered.

Noble Smith says that neither drugs, local applications nor other general methods are of any permanent use in the treatment of well-established spasmodic wry-neck.* [18]

T. H. Meyers states that because of the lack of exact knowledge of this condition, emperical measures are justified and, therefore, I wish to call attention to conium and atropin; I gave conium in steadily increasing doses. Beginning September 10, 1892, with five drops three times a day, each day the amount was increased two drops; when vision was affected, decreased dose and again increased. On November 5th, she took eighty drops; on the 23rd, one hundred and forty drops; legs were very weak, intensity of muscular spasm diminished a little. Aqueous solution of sulphate of atropin was injected into the painful points of the muscle once a day. On November 25th, four drops of a solution one grain to the ounce, was injected; on the 28th, six drops; the spasm diminished immediately after the injection. There was some nausea and vomiting; the patient became despondent; the spasm disappeared, for several hours only, after the injection; patient refused to continue treatment.

In another case, I gave conium in conjunction with a spinal assistance brace; improvement followed after a month's treatment. After a year's treatment, the patient took one hundred and eighty drops of conium daily and was greatly improved, but the spasms did not entirely disappear.* [17]

F. de Quervain mentions that every kind of antispasmodic has been tried; zinc bromides, valeriana, belladonna, hemlock, morphine and chloral with very indifferent results.* [27]

C. S. Potts believes that, before resorting to surgical interference, medical means should first be exhausted. We ought to try absolute rest in bed with the head low, massage, passive movements, actual cautery as a counter-irritant, electricity, full doses of either gelsemium, conium, hyocine, bromides, iodides or atropin. The latter is better administered hypodermatically into the affected muscles.* [28]

I have personally tried salicylate of soda, apomorphia, lobelia and other drugs previously mentioned, without any lasting benefit.

Group 4.—Mechanical. There were three cases treated by this method. Result: One improved, two recovered.

H. J. Hall invented a clamp, which is very simple in its construction. It is made of light spring steel broader than, but in many ways similar to, the ordinary trousers guard worn by bicyclists. It has a tail piece running from the middle of the spring about six inches down the back. When the clothing is buttoned tightly over it, this tail piece helps to keep the spring closely applied. A gentle pressure is thus exerted on the side and back of the neck, as far forward as the anterior border of the sterno-cleido mastoid muscles. The best results are obtained when the spring is worn at about the level of the angle of the jaw. In several cases in which it was used, the apparatus instantly stopped most of the twitching, although the symptoms would at once recur upon removal of the pressure. This apparatus, when carefully made, can be worn with very little discomfort and is less noticeable than any other apparatus proposed.* [12]

G. R. Elliott describes an apparatus, which is worth consideration in this paper. The apparatus usually applied in these cases is of the rigid type; patient gets tired and discards it. My apparatus affords necessary support without absolutely restricting any normal movement of the head. The apparatus made by Tiemann has a hard rubber chin piece and two uprights holding the back and sides of the head—the chin piece can easily be removed—these are secured to an upright over which is placed a coil spring in such a way that the force of the spring can be directed to a greater or less degree against the spasm. If the spasm is very violent, the spring naturally gives and allows the head to take the extreme torticollis position; when the violent spasm has passed, it again forces the head into the normal position. The spring can be adjusted so that it cannot force the head beyond the median line, and thus does not exert any force when the head is held in normal position.* [32]

I have personally used a brace with a spring clamp similar to the one described by Dr. Hall, but the clamps were adjusted so that their padded ends would go over the angles of the jaw. A perpendicular support, extending from a cross piece with straps to be adjusted about the chest, running up the back of the neck to the head high enough to adjust a curved cross piece with straps to pass around the forehead, the spring clamp being attached to it four inches lower down. The most successful rigid support that I have been able to construct was made out of plaster of Paris. I applied a body cast from the hips, including the chest and head, which, after the plaster was well set, I trimmed out very extensively, giving large amount of room for the arms, trimmed out over the abdominal region as much as was possible without weakening the support; also the head was trimmed in such a manner as to

leave only a head band and a strong posterior support. (See Fig. 2.)

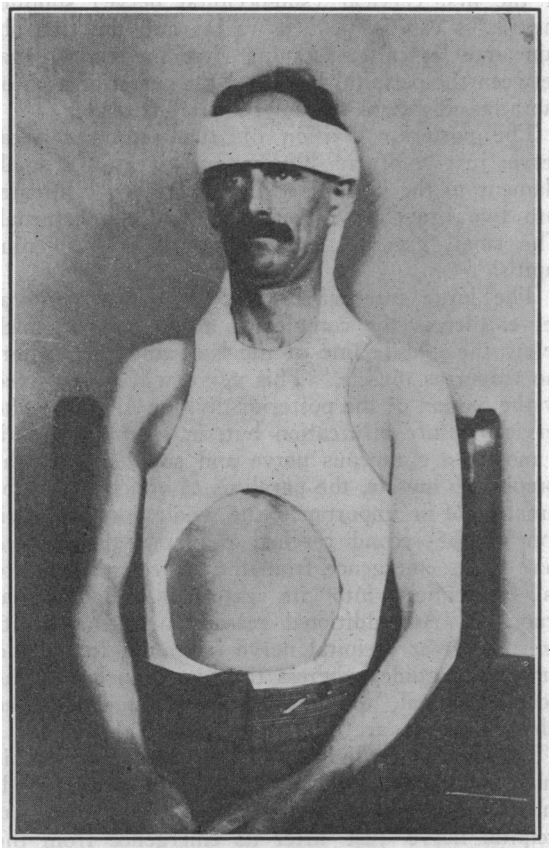

Figure 2.

My cases were rather aggravated than benefitted by the use of these supports, although while they had them on, the patients were able to walk without the assistance of the hands.

Group 5.—Ligation of Spinal Accessory Nerve With Silver Wire. Under this group, I found two cases. Result: One unimproved, one recovered.

This operation was first done by Mayo Collier in 1890.*18 The procedure consists of exposing the spinal accessory nerve, and placing about it a loop of silver wire, which is twisted tightly.

Group 6.—Division of Cervical Muscles. Under this group, we have fourteen cases. Result: Four improved, three unimproved, seven cured.

Kocher is the chief exponent of this method. The operation for dividing the sterno-cleido mastoid muscle is performed in the following manner: An incision five or six centimeters in length is made, beginning at the anterior margin of the sterno-cleido mastoid muscle, opposite the angle of the jaw and directed slightly upward so as to pass at a distance of from three to four centimeters below the mastoid process and following the natural folds of the skin. This incision gives an invisible scar; the platisma myoides is divided. A grooved director is introduced beneath the sterno-cleido mastoid muscle, which is divided layer by layer. In severe cases, instead of simple division, from two to three centimeters of the muscle are resected.

The Division of Posterior Cervical Muscles. An incision from the apex of the mastoid process to the middle of the cervical region is made; the trapezius is first divided; then the splenius capitis; then the complexus, major and minor (the great occipital nerve must not be injured); the obliquus capitis is then divided and the wound closed. The recti muscles have little rotating power and can be left intact.*27

Group 7.—Stretching of Spinal Accessory Nerve. Under this group, one case reported. Result: Recovered.

This operation consists in exposing the spinal accessory nerve and dissecting it free, sufficiently so that one or two fingers may be placed beneath it. The nerve is then stretched—first the distal end and then the proximal, care being taken not to rupture the nerve. This operation is practically obsolete. While it may afford temporary relief, the condition almost invariably returns.

Group 8.—Division of Spinal Accessory Nerve. Thirteen cases mentioned. Results: Five improved, eight recovered.

Operation: The spinal accessory nerve passes downward and backward from the jugular foramen and enters the anterior border of the sterno-cleido mastoid muscle at a point about one and a half inches below the tip of the mastoid process. At this point it should be exposed. Dr. E. Eliot, Jr., from a special study of the course and relations of the nerve, suggests the following method:

"As the nerve is situated at a considerable depth, the incision should be generous, and should extend from the mastoid process above downward to one or two inches beyond the angle of the jaw. The anterior edge of the sterno-cleido mastoid should then be exposed. In the upper part of the wound the posterior and inferior portion of the parotid gland may have to be drawn forward, although usually it does not overlap the muscle. When this is done it is comparatively easy to expose, by blunt dissection, the transverse process of the atlas, as it lies directly below the mastoid process above; while immediately in front of this bony prominence, and running downward and forward from the mastoid process toward the angle of the jaw, is the posterior belly of the digastric. Behind this lie the main vessels of the neck, with the spinal accessory nerve emerging from the jugular foramen, and the operator is certain no harm can be done to these structures as long as he remains superficial to the digastric belly, which, in its turn, lies at a considerable depth—in fact, at about the level of the transverse process of the atlas.

"Owen and Petit have drawn attention to the fact that the nerve usually enters the mastoid muscle at a point opposite the angle of the jaw. I have found, however, in a large majority of cases, that, on leaving the internal jugular it assumes a definite relationship with the transverse process of the atlas. Never above it, sometimes directly over it, usually a fraction of an inch in front of its most

prominent part, the nerve may easily be detected in the small amount of connective tissue that envelops it, and from this point to its entrance into the belly of the muscle, it may be isolated with safety and treated by any suitable procedure. If, exceptionally, it should escape detection, the anterior border of the muscle should be drawn sharply backward at a point opposite the angle of the jaw, the nerve in this way put on the stretch, and by blunt dissection in the adipose tissues that separates the under surface of the muscle from the sheath of the vessels, the nerve may be readily exposed. Usually the nerve passes from under the posterior belly of the digastric, at a point just in front of the transverse process of the atlas, to a point on the deep surface of the muscle just behind its anterior margin opposite the angle of the inferior maxilla. It is sometimes accompanied by a small artery and vein, the latter easily visible, the former a branch of the occipital. Rarely, the nerve lies at a considerable distance from the transverse process of the atlas; in one case, as much as half an inch anteriorly. Here the nerve could be found at its entrance into the muscle, the landmark of the transverse process having failed to localize its situation."

Richardson suggests that if the nerve is not readily found, its position may be ascertained by drawing the finger-nail firmly across the bottom of the wound, a sharp contraction following pressure upon it. The nerve having been isolated, a section of an inch should be removed. Richardson advises, in addition, vigorous stretching of both extremities. After division of the nerve, the spasmodic contraction relaxes and the muscles become flaccid, allowing the head to be brought to the normal position, or if the deformity has become permanent the contracted parts may be divided as in the ordinary form. Fixation of the head is not, as a rule, required. The operation should be supplemented by massage and by muscle-training.*41.

Group 9.—Division of Spinal Accessory Nerve and Posterior Branches of the Upper Three Cervical Roots. Seven cases given. Results: One improved and six recovered.

Anatomy. The chief posterior cervical muscles that rotate the head are the splenius capitis, the rectus capitis, posticus major and the obliquus capitis inferior. The splenius capitis is supplied by the external branches of the posterior divisions of the second and third cervical nerves; the rectus capitis is supplied by the sub-occipital from the first cervical; and the obliquus capitis inferior, by the sub-occipital and a branch from the second cervical.

An important anatomical point in recognizing the muscles and nerves is the sub-occipital triangle; the two oblique muscles for the superior and inferior border of the triangle running from the tip of the transverse process of the atlas to the spinous process of the axis, and to the occipital bone, respectively. The rectus capitis posticus major, which forms the third or inner border of the triangle, arises from the spine of the axis and is inserted into the inferior curved line of the occipital bone. The sub-occipital nerve emerges from this triangle, and in it the vertebral artery.

The nerves to be re-sected are the posterior divisions of the first three cervical roots. The posterior of the first cervical (sub-occipital nerve) supplies the rectus capitis, posticus major and the two oblique muscles; after escaping from the spinal canal between the occipital bone and the posterior arch of the atlas, it enters the sub-occipital triangle.

The posterior division of the second cervical nerve, just before its bifurcation, gives off a small filament to the inferior oblique. It then bifurcates into two branches, the internal and the external. The small external branch supplies the splenius capitis.

The large internal branch, the great occipital nerve, pierces the complexius about one-half inch below the middle line of the back and then enters the trapezius muscle. This nerve will be involved by the section of the posterior division of the second cervical before bifurcation but, in as much as this is mostly a cutaneous nerve and supplies only the complexius muscle, the paralysis of which would be a matter of no importance, the whole posterior division of the second cervical root may be divided close to its emergence from the spine, and prior to its bifurcation into its external and internal branches. An additional reason is that, from its size, the great occipital nerve is readily found and serves as a guide, whereas the two branches of the second cervical, to the inferior oblique and the splenius capitis, are difficult to find.

The posterior division of the third cervical is much smaller than the others, but is easily found, under the complexus, about an inch below the great occipital nerve just after its emergence from the spine; it divides into the internal branch, which is cutaneous, and the external, which supplies the splenius capitis and other muscles. It is best to divide the main trunk, as it is more easily found than its branches.

Operation. Patient shaved.

1. Make a transverse incision about one-half inch below the level of the lobule of the ear, from the middle of the neck posteriorly, or even slightly overlapping the middle. This incision should be two and one-half or three inches long.
2. Divide the trapezius transversely.
3. Dissect the trapezius and find occipital major nerve as it emerges from the complexus and enters the trapezius.
4. Divide the complexus transversely at the level of the nerve. This division should be made by repeated small cuts, so as not to cut the nerve which is our guide. Then dissect the nerve down from the anterior surface of the complexus; cut, or better, ex-sect a portion of the posterior division before the occipital major arises from it, so as to catch the filament to the inferior oblique muscle. This divides the second cervical nerve.
5. Recognize the inferior oblique muscle by following the sub-occipital nerve towards the spine; the nerve passes immediately below the border of the muscle.
6. Recognize the sub-occipital triangle formed by the two oblique muscles and the rectus capitis posticus major. In this triangle lies the sub-occipi-

tal close to the occiput. It should be traced down to the spine and be divided, or better, ex-sected. This divides the first cervical nerve.

7. An inch lower down than the occipital and under the complexus is the external branch of the posterior division of the third cervical nerve to the splenius capitis. When found, divide or ex-sect close to the bifurcation of the main trunk. This divides the third cervical nerve. Insert a drainage tube and horse hairs; patient lies on back.

Author's operation for the relief of spasmodic torticollis. An incision is made along the anterior border of the sterno-cleido mastoid muscle from the mastoid process to the sternum, joined by a transverse incision three inches in length, following the course of the clavicle. The sterno-cleido mastoid muscle is cut free from its sternal and clavicular attachments.

The cervical fascia is divided and the sterno-cleido mastoid muscle, skin, fascia, etc., are dissected free and retracted backwards, well behind the deep vessels of the neck. By carefully separating the sterno-cleido mastoid muscle from the underlying tissue at its upper extremity, it is quite easy to recognize the spinal accessory nerve as it passes into the sterno-cleido mastoid muscle. Do not look too deep; it is quite superficial when such an extensive incision has been made. It can be found about an inch and a half below the mastoid process. After it has been found, it should be freed to such an extent that at least one or two fingers can be placed beneath it; it should then be thoroughly stretched and its several branches should be cut as close to the muscle as possible. Grasp the proximal end with a strong artery forcep and proceed to wind it on the forceps so as to avulse it from its origin.

By careful blunt disection, posterior to the deep vessels, the transverse processes of the upper cervical vertebrae are soon exposed. The vessels, lymphatics and fatty tissue are retracted forward and the second, third and fourth cervical roots can readily be brought into view. Of these, the second and third roots are divided as close to their origin, and as much of the nerve is destroyed by avulsion and exsection, as is possible. The first cervical root cannot be reached. The phrenic nerve must be located and care taken not to injure it.

The sterno-cleido mastoid muscle is again sutured to its severed sternal and clavicular attachments; the superficial cervical fascia is re-united by fine interrupted sutures, a carefully placed subcuticular silk worm gut, in three pieces, closes the wound most satisfactorily and, when carefully done, leaves a very slight scar. A plaster-of-Paris dressing with the head in the normal position is applied, extending around the upper part of the chest, neck and head. It is trimmed out thoroughly to furnish abundance of arm room, also trimmed about the head and face until only a band about the forehead and a strong support in the back of the neck remains. This can be removed at the end of a week or ten days, the sub-cuticular stitches removed, and the patient allowed to leave the hospital with instructions to avoid excitement, to eat plenty of nourishing food and remain out of doors as much as possible. This is done for the reason that a great deal of blood is lost during the operation and the patients are, as a rule, in a run-down condition. There will probably be some twitching remain, which, however, disappears in from one to three months.

Conclusion. Judging from results obtained from the different methods of treatment, there is no question in my mind but that the most satisfactory treatment is surgical.

The simple division of the spinal accessory nerve gives some good results, yet, in many cases, the cure is not complete and a second operation is frequently refused, leaving the patient in a condition little better than he was before the operation. I, therefore, am of the belief that the greatest amount of satisfaction to both the patient and the surgeon will be derived from making the extensive operation which I recommend whereby the spinal accessory nerve and the second and third cervical roots are resected.

It is true that there are cases which are cured by the simple division of the spinal accessory nerve, and the division of nerve roots would be superfluous, but the amount of atrophy and loss of motion following the resection of these two roots is so small, that the damage done by cutting them unnecessarily, really amounts to nothing.

(*To be continued.*)

SPIRAL ORGANISMS IN RELATION TO SYPHILIS.*

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So much interest has been manifested in Schaudinn's announcement of the discovery of the organism causing syphilis, and so positive is the evidence accumulating in its favor, that I am led to ask you to consider with me its value as a means of making an early differential diagnosis of syphilis, and in so doing will direct your attention to other spiral organisms present in disease.

With the beginning of last year—1905—the spirochete entered the field as an important factor in the etiology of disease with the discovery by Ross and Milne of the presence of such organisms in the blood of patients suffering from "tick fever" in the Congo Free State. Dutton and Todd later established that they were transmitted by a tick (Ornithodorus moubata) which had become infected by biting patients suffering from "tick fever," and Koch confirmed these observations.

For the spirochete of relapsing fever—spirochete Obermeieri—similar relations seem to obtain, for it was long since announced by Karlinski that this spirochete could remain alive in the bedbug (cimex or acanthia lectularis) as long as thirty days, and Schaudinn has demonstrated that the spirochete of relapsing fever multiplies in the intestines of the bedbug and is voided with its feces. The contamination by its feces of the organs by which the insect feeds is a method by which relapsing fever is spread from person to person; it is also transmitted

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